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ABSTRACT

This pamphlet provides American Institute of Physics (AIP) member society officers with information on science public information (PI), particularly those officers of scientific organizations and universities located in smaller communities where it may be hard to get direct assistance from centralized PI offices. Chapter I provides some general guidelines, including what kinds of material to supply to media people. Chapter II discusses the news release, considering the quality of releases and how the form of a release sent to the print media might differ from the form used for a radio station or network, or a television station or network. Chapter III offers suggestions on preparing for and conducting a news conference. Chapter IV is addressd to the individual who seeks publicity for a new research development. Suggestions for notifying the media and speaking on television are offered. Chapter V is addressed to the individual scientist or expert who is approached by the local media. Additional comments on television coverage, the role of PI offices when media approach scientists, and comments on establishing ground rules are provided. Chapter VI presents a list of "don'ts" covering faults which editors complain of most frequently. Sample news releases are included in appendices. (JN)

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PHYSICS GOES PUBLIC

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To this end the institute publishes scientific journals; provides abstracting and indexing services, serves the public by making available to the press and other channels of public information reliable communications on physics and astronomy and their progress; carries on extensive manpower activities; encourages and assists in the documentation and study of the history and philosophy of recent physics; cooperates with local, national, and international organizations devoted to physics and related sciences; and fosters the relations of the science of physics to other sciences and to the arts and industries.

The physicists served by the Institute number more than 56,000 members in its member societies. In addition, approximately 6,000 students in over 465 colleges and universities are members of the Institute's Society of Physics Students, which includes the honor society component Sigma Pi Sigma. Industry is represented through some 110 Corporate Associate members.

The purpose of the AIP's Public Information Division is to engender a public understanding of the role of physics in society, and provide an appreciation of the developments in physics by assisting member societies in conveying information about research, education, and manpower.

PHYSICS GOES PUBLIC

by

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INTRODUCTION

The purpose of this pamphlet is to supply the how-to's, the do's, and the don'ts of science public information (PI). It's aimed primarily at Member Society Officers of scientific organizations and universities, especially those located in smaller communities where it may be hard to get direct assistance from centralized PI offices.

What follows is a distillation of AIP's experiences. These simple rules will ease the anxiety of the person who may be asked to run a newsroom for a local physics meeting, or must announce the news when his or her organization has made an important discovery.

We've included guidelines for scientists who want to approach the various media with news about their own work. On the other hand, these same scientists may be in the reverse situation, where the news media woo *them*. We also offer suggestions that could help consummate that happy union.

You'll be able to handle all these PI situations with this booklet and your own good sense. But please feel free to contact us if you have problems or questions.

Audrey Likely

TABLE OF CONTENTS

Introduction

CHAPTER I. SOME GENERAL GUIDELINES 1
- A. What to Tell the Public 1
- B. Hang it on a News Peg 1
- C. Media Gatekeepers 2
- D. The Kinds of Material to Supply to Media People 2

CHAPTER II. THE NEWS RELEASE—THE PI WORKHORSE 3
- A. The Mailing List—A First Step —Personal Relationships Help 3
- B. Quality of Releases 3
- C. Form of a Release Sent to Print Media 4
- D. Supplements to the Release 5
- E. Form of a Release Sent to a Radio Station or Network 6
- F. Form of a Release Sent to a Television Station or Network 7

CHAPTER III. RUNNING A NEWS ROOM 8
- A. Advance Preparations 8
  - —The General Release Announcing the Meeting 8
  - —Lay-Language Version of Important Scientific Papers 9
  - —Inviting Speakers to News Conferences and Conference Schedules 10
  - —The News Conference Room 10
- B. During the News Conference 12
- C. After the Meeting 13

CHAPTER IV. PI FOR THE INDIVIDUAL WHO SEEKS PUBLICITY FOR A NEW RESEARCH DEVELOPMENT 14
- A. Notifying the Media 14
- B. Television Coverage–Simplicity, Clarity, Brevity 14

CHAPTER V. PI FOR THE INDIVIDUAL APPROACHED BY LOCAL MEDIA 16
- A. Find Out the Reporter's Credentials and Establish Ground Rules 16
- B. More on TV Coverage 17
- C. Role of PI Offices When Media Approach Scientists 17

CHAPTER VI. THE DON'TS OF PI 18

Afterword 19

Appendices 20

CHAPTER I
SOME GENERAL GUIDELINES

A. What to Tell the Public

Science news should be made available to the public. After all, it's the voter/taxpayer who directly and indirectly supports science. However, as a scientist or employee of a scientific organization who's interested in PI, you won't, in most cases, be able to contact the public directly. Instead, you have to relay your message to the public through the news media go-betweens. They control the tools that can communicate your message to their enormous audiences.

People are always interested in timely stories, and the media want to satisfy that interest. Scientists and their PI officers can provide science stories of timely significance to the news media who in turn spread the word—through newspapers, magazines, TV news broadcasts, and radio news programs. A new discovery or application, after having been published in a scientific publication, or about to be published in one, obviously rates as science news. But you may also want to keep in mind other scientific, newsworthy events that are equally worth communicating, although perhaps having less impact:

—The scientific aspect of public issues, such as conservation or nuclear energy, is an important category of news to be reported.

—Technical advice and general education, especially when it is everyday advice, such as an energy-saving technique.

—Announcements of all kinds, meetings, lectures, awards, luncheon and dinner speeches, the publishing of special reports or books, resolutions, local actions.

—Human interest stories involving science.

B. Hang it on a News Peg

In short, all items that appear to you to be news under the broad categories listed above are candidates for public communication. But the news media will pay more attention to your announcements if you haven't contacted them too often about minor news. You're better off by far if you can hang your news item upon what reporters call a "news peg." A news peg is a current event or condition, already in the news, that relates to your institution's new discovery, or to its scientific

comments on public issues, or to its technical advice. Your job often will be to establish this relationship in your news releases which, though requiring only a sentence or two to express, can sometimes be difficult to pinpoint. Make a connection between what you want to report and, say, a bill going through Congress or some current controversy surrounding the question at hand—something topical. Reporters and other media people will look for a news peg on their own and you might be happier with one that you help them find.

C. Media Gatekeepers

You get to the public by supplying material, usually in the form of a printed news release, to media representatives—the gatekeepers to the public's eye. They control the flow of print and electronic material reaching the public. And who are these media gatekeepers?

—reporters

—editors of wire news, feature news

—producers, assignment editors, and news directors of TV and radio stations (Many large newspapers, magazines, and TV and radio networks and stations have science specialists who may be reporters, editors, or producers.)

—staff reporters and freelance writers for magazines, trade, and professional journals (Remember: science-minded audiences who read trade journals also help make up the public.)

These are the individuals who will receive your science news reports and then communicate them to wide audiences. But what form should your messages take?

D. The Kinds of Material to Supply to Media People

You can supply news material to media representatives by using several different methods. Your basic input is the printed news release and its supplements that you send to media representatives through the mail. News conferences that you arrange bring scientists and the media face to face. You can also invite press and broadcast reporters to luncheons and banquets that feature notable speakers. We'll now discuss these input avenues in more detail.

CHAPTER II
THE NEWS RELEASE—THE PI WORKHORSE

In most cases material is supplied to the news media through a printed news release, the backbone and workhorse of every public information program. News releases are your primary means of informing the media. But as we shall see shortly, these releases must be tailored to the various types of media.

A. The Mailing List—A First Step

The first step into the land of PI is to develop a mailing list of all the editors and writers whom you would like to run stories based on your releases. Deciding on which media to contact is simple: Do you want to see your news in a particular newspaper, on local TV or radio news, or in magazines? Any publication or broadcast that treats science as an offshoot of astrology or commonly displays large headlines of the ADAM AND EVE WERE ASTRONAUTS! genre should of course be excluded from your list. While you want your mailing to be as widely distributed as possible, you have to weed out those purveyors of news that could, and usually will, distort your message.

Personal Relationships Help—The people on the mailing list receiving the releases may or may not use the material. This is clearly their prerogative. So it is almost a must, if you plan to be involved in PI for long, to develop personal, professional, and even social relationships with some of these people. After all, editors and writers are inundated with all kinds of releases competing for media coverage. You have an advantage if they know who you are and what your scientific establishment is about through personal exchanges. Also, editors and reporters will feel free to phone you if they require further information. They might even sound you out for story leads.

B. Quality of Releases

Far more important than your personal relationship with individual media people is the quality of your news release. The media depend on your organization's printed word to maintain their own credibility. If you fail to provide an accurate report, and it comes to light only after it's been printed or read on the air, you have failed egregiously. It would be too much to expect a writer or broadcaster to use your material in the future once he has been "burned."

Probably the most important rule about a news release is this: If you do not have the time or resources to do it correctly, you're far better off

not doing it at all. A news release, while able to communicate your message to the public, can also make you vulnerable. Never attempt to do it in a weak or inept way.

Your major goal in preparing a top-notch release has to be painstakingly good writing. Experienced science writers are known for their felicitous prose, scientific accuracy, and an eye for that sometimes elusive newspeg. But PI science writing also requires the approval of the scientist(s) whose work you are reporting. In addition, it's advisable to have each release approved by a high-ranking scientist/administrator from your organization.

As a writer for a scientific organization you should reflect a scientific, objective approach to the news. For example, controversy, if it exists as a part of the story, must be reported in your release. As long as you state things fairly in a way that accurately characterizes the amount of support opposing positions hold, you will be doing a good job of informing the public.

The news release, then, is your basic PI tool. And like a carpenter's hammer or a musician's instrument, it's best to have the best. But the best release takes a slightly different form for each of the various types of media at which it is aimed.

C. Form of a Release Sent to Print Media

The form you use for a news release sent to print media will differ from the release you send to a TV or radio station. The form aimed at newspapers or magazines is your basic release, and can still serve for a TV or radio station in a pinch. Print-oriented releases should also be supplied as hand-out material at meetings during a news conference, or they can be mailed out readily to just about anyone requesting accurate information on the subject covered. Following are some basic guidelines for the print-oriented news release (study the example in Appendix A):

Print-Oriented News Releases

1. Letterhead—The letterhead should clearly state NEWS RELEASE in large type at the top. "NEWS" release is better than "PRESS" release since it applies more aptly to all media. Do not use the ordinary letterhead of your organization for this specialized communication. Letterhead should identify the PI officer who can be contacted by the media for further information.
2. Paper—8½″×11″ white paper is preferred, although legal-size is acceptable.
3. Keep your release brief. Few releases should exceed two pages.
4. Typewrite, mimeograph, or multilith. Do not send carbons to media.
5. Double-space all copy. Use wide margins. Do not hyphenate words at ends of lines. Do not carry a paragraph over from one page to the next.

6. Use one side of the paper only.
7. Specify a release date prominently at the top of the page and the day and time the story can be used. If it is for use on receipt of the release, mark it "FOR IMMEDIATE RELEASE." But even on "IMMEDIATE RELEASE" copy, include at the end of the release or in a dateline at the beginning, the date it was sent. This is a help to editors when their mail piles up.
8. Do not write a headline. But a one-line explanation at the top, pointing out the significance of the story, helps the science writer who must look through many releases.
9. Unless it is for local news media only, put the location of the news at the beginning of the first paragraph (e.g. Chicago—:). If you decide to date your release at the beginning rather than the end, the date follows the location (e.g. Atlantic City, N.J., Sept. 10—:). If you designate FOR IMMEDIATE RELEASE, be sure releases do not get to the media before the date in your dateline. If you use a dateline and send the story to the media in advance, be sure to specify the time and date of release.
10. Send your releases to the local editor at least a day or two ahead of the release date. For Sunday papers, send articles three or four days before specified publication date. Weekly papers often need stories one or two weeks ahead of publication. Monthly magazines need at least six weeks notice.
11. If your release requires more than one page, type "more" at the bottom of each page except the last. In the upper left-hand corner of each succeeding page, type the subject of the story and the page number. Or you can center the page number. The end of the story should be marked -END- or # # # or -30-.
12. Mail all material First Class to newspapers, magazines, radio and TV stations. Mark both sides of envelopes "First Class."

D. Supplements to the Release

You may also want to include the following additional material which will reinforce your communication with the media. In fact, your supplementary material may prove to be the raison d'être for an editor to run your material.

1. *Photographs, charts, or drawings* should be included when they describe and clarify the subject. Use 5" × 7" or 8" × 10" glossy black and white prints which reproduce better than matte- or dull-finish. Do not

underestimate the importance of photographs and other illustrations. If they are good, they often can be the most persuasive aspect of your release for getting it in the papers.

Photos of people doing things generally are the most effective. But limit the number of people in a picture to as few as possible. Identify the subjects when the picture is taken and attach a complete and accurate caption. Double-check the left-to-right identification of people. The caption (above the picture) or cut line (below the picture) should be attached to the picture so that it can be read while looking at the picture. Don't just paste it on the back. In fact, don't write on the back of a photograph because it can show through on the picture side. If necessary, however, write very lightly with a grease pencil or soft lead pencil and only in the margin.

2. *Lay-language abstracts* are scientific papers upon which a release is based. They have been shortened and rewritten in popular language by the original authors of the scientific papers (see more on this on p. 9 plus Appendix B).
3. *Backgrounder*—This is additional material explaining the release, although the release should stand on its own.
4. *Biographies and recent photographs* of the principal(s) in the story.
5. *References*—Editors and writers will always favor the well-referenced release, especially if a story is technical or controversial. The newspaper people then have the option of rechecking the facts themselves.

E. Form of a Release Sent to a Radio Station or Network

While the basic, print-oriented release could be sent to a radio station, you'll ease a station's workload by preparing a release specifically tailored to a station's needs. A radio release can be read directly over the air.

Radio Release

1. Triple-space all copy on 8½" × 11" white paper, using the largest type face you have. Type only on one side of a sheet. Start typing one-third of the way down the page and leave wide margins.
2. Be sure to give specific dates. If you're announcing an event of more than one day's duration, designate specific dates the release can be used (e.g. "For Use Between July 4 and July 7," *not* "For Use Between Monday and Thursday").
3. Write copy for the ear, which means in a style more informal than copy for the eye. Use "don't" and "let's"

instead of "do not" and "let us." It's most important to double-check your copy for tongue twisters and stiltedness by reading all copy aloud.

4. If names in your release are difficult to pronounce, give the phonetic spelling in the wide, left margin.
5. Never abbreviate or hyphenate words. Always spell out numbers.
6. Be brief. One paragraph should suffice.

F. Form of a Release Sent to a Television Station or Network.

Releases for television should be one of two kinds: 1) an information memo to advise a station of a story so it can send its own film crew, or 2) a so-called "TV newsfilm or tape" which is a 60- to 90-second, 16 mm silent film or ¾" videocassette with an accompanying script. If your science organization can afford newsfilm or tape, it provides the footage which a station can run while the local newscaster reads the news item from the accompanying script. But, your footage must be of professional TV quality or it has no hope of being aired. Where you cannot provide footage, high-quality photographs, preferably color, or slides will serve as adequate video material but will most likely be aired only if the photographs are extraordinary and one of a kind.

Rules for preparing a TV script are exactly the same as for radio except the typed page is divided into two equal-width columns. The right side for audio—what is read on the air, and the left for video—what is to be shown at each point during the narration (see Appendix C). Designate slide changes in the body of your script with the symbol /.

CHAPTER III
RUNNING A NEWS ROOM

In addition to sending out news releases to the media, your PI department might be running meetings at which significant papers are delivered. In that case, a news conference is in order. Here's a situation where, if you play your cards right, the media will come to you, a switch from the more typical, opposite situation. Handling your cards well means stacking the deck—making careful preparations where the important emphasis is on providing services for the reporters, writers, and broadcasters who attend your conferences. A winning hand (that's good preparation mixed with luck) can pay off handsomely in media coverage—the object of the game.

A. Advance Preparations

Careful planning and promotion of a news conference are vital. You must give yourself enough time before the meeting to write and send out all the various sub-groups of print-oriented releases.

The General Release Announcing the Meeting—First, you must publicize the meeting through a *general news release* (see Appendix D). Such a release, besides just being a concise meeting announcement for members of the physics community, sets the backdrop for the news conferences that will be held during the time of the meeting. The news conferences will usually be of most interest to news people. For a large meeting of national importance, a general meeting announcement release is sent to all important newspapers, magazines, and wire services. For smaller divisional or regional meetings, releases are distributed at the local level only. Again, be aware that monthly magazines need at least six weeks notice, Sunday papers need three or four days notice, and dailies a day or two. Probably monthly trade magazines work best for attracting technical writers.

The general announcement release should point out meeting highlights—the important papers to be delivered, awards, special guest appearances, etc. For the sake of news coverage, the main events to emphasize are the scientific papers that have news value. You should, when writing the release, meet with professional scientists within your organization to go over the abstracts submitted to the meeting in order to determine just which papers are really newsworthy. You make your decisions by asking yourselves if a paper meets the following criteria:

—Do the results represent a physics discovery?

—Are the results actually new, or have they been reported before?

—Is it likely that a reporter could use the information in an article or as a broadcast item?

—Do the results relate to a newsworthy subject? Often, a relatively minor story related to an important topic (e.g. energy) will get more play than a very important story about an esoteric subject. Think "newspeg."

After you and your colleagues have decided which papers should be singled out in the general news release, or warrant a news conference, you should then write the general news release, and include the following information:

—The title, date, time, location, and purpose of the meeting

—The whereabouts of the newsroom

—General information about news conferences

—A summary of the main sessions or papers of the meeting

—A summary of awards to be given or officers to be installed

—Other services

Lay-Language Versions of Important Scientific Papers—Authors of the chosen papers are then asked by you to submit short one or two page versions of their talks. Convey to the authors that these lay-language abstracts should be written by them in a style that can be easily understood by science reporters, who are not necessarily experts in the reported field. Mathematical formulas should be avoided. Ultimately, these lay-language abstracts will be made available during the news conferences and as supplements to the releases sent in advance to news media representatives.

The authors of scientific papers who are asked to write lay-language versions will usually cooperate with you since you represent the meeting's sponsors. Occasionally, however, a scientist fears that a lay-language version of his paper and his presence at a news conference will be misunderstood by his colleagues as unscrupulous publicity seeking. If this happens, point out to the author that the report has news value, regardless of whether or not a popular-language version is available or the author appears at a news conference. But, by appearing at the news conference and providing the popular version, scientists increase the likelihood of accurate reporting.

Roughly 10% of the papers given at a meeting are chosen to be cast in lay-language versions. Of those that are chosen, approximately 25–40% of the scientists will actually respond with popular versions of their papers. These should be copied by photo offset and given cover sheets which contain:

—Date of release: one half-day after the paper is presented at the meeting

—Name, place, and date of the meeting

—The author's name and affiliation

—The topic of this paper
(see Appendix B)

Inviting Speakers to News Conferences and Conference Schedule—The authors of the eight or ten most important papers, whether or not they've responded with a lay-language version, should now be asked to appear at news conferences. Conferences can be held for single scientists, but it is generally more practical to invite all of the speakers from a session of particular importance; this means a maximum of four or five speakers (for a particular session of invited talks) plus the person chairing the session. With several speakers, you get different perspectives on the same topic, allowing news reporters to cover the subject in greater depth. It may also afford an opportunity to air various contending opinions on a controversial matter.

Scientists who present papers in the afternoon are usually scheduled for morning news conferences. Morning speakers are scheduled for afternoon news conferences. This is the best way of insuring the appearance of busy scientists, who may well be at the meeting for only that one day. Here are several more hints:

—Schedule conferences between 10 A.M. and 2 P.M. This allows for the reporters' deadlines, and keeps them from leaving early.

—Do not schedule conferences on the last day of the meeting; many people have left by then.

—Unless the person honored is another Einstein, papers from commemorative or ceremonial sessions have little value as news and are not popular with reporters.

A certain amount of juggling may be needed to accommodate as many speakers as possible. When a final schedule has been reached, a summary of the news conferences can be drawn up as a news release (see Appendix E), listing hours of conferences and synopses of all conferences. This schedule is sent out with popular-language papers to the news media a week to ten days before the meeting starts. The popular-language papers provide readily quotable material in the scientists' own written words.

The News Conference Room—The newsroom is the natural meeting place for reporters and scientists. Besides being the location for all news conferences, the newsroom is used by reporters for preparing articles and for arranging and holding interviews with scientists.

A newsroom ideally is three separate, adjoining rooms: one to serve as news headquarters, another for scheduled news conferences, and one for special interviews. *The news headquarters section* is actually an adjoining room that contains the following items:

—At least two typewriters, one electric and one manual

—Wastebaskets

—Clothes rack

—Pitchers of iced water and glasses

—A bulletin board

—Long tables on which lay-language abstracts will be easily available to the science writers/broadcasters

—A sign outside of the room saying "Newsroom." Also, place directional signs to the newsroom in the lobby and in the corridors

—Two telephones (at least one of which should be an outside line)

—A copying machine

—A small table to use for registering the members of the media as they arrive

—Guest book

—Badges for the members of the media to wear

—Copies of the general meeting program or bulletin

—Extra copies of the general release, news conference schedules, and lay-language papers

—That day's daily newspapers

—Ashtrays

—A bottomless coffee urn, hot water and teabags, cups and saucers

In addition to these items, unofficial courtesies help to make the newsroom a congenial and efficient operation on which invited scientists and reporters can rely. For example, some people will need to check coats or luggage during working hours, or need advice on how to obtain accommodations or transportation. Therefore, it is wise to plan on having someone in the newsroom at all times who is unflappable. This person will be called upon to supply change, tell where the meeting rooms are located, recommend restaurants, suggest gifts for the folks at home, smilingly explain to scientists who wander in that the coffee and tea are for reporters, as are the lay-language abstracts, and that they can pick up extra copies of the latter on the last day of the meeting. This person should also have a list of names of a physician, dentist, or whatever. A small amount of research in these areas will keep things running smoothly and make your news room a natural place for reporters to congregate.

The room where the news conferences will be held should be arranged auditorium-style (a few rows of chairs for the audience and a dais in front with four or five seats facing the audience). Behind the dais, there should be two blackboards with chalk and erasers. It's a good idea to separate the smokers from the non-smokers by putting the "nons" on the side of the room closer to the windows, and the smokers on the other side. For them, place ashtrays on alternate seats. There should be pitchers of water and glasses on the dais for the speakers. Be sure there are enough electric outlets in the room as well as extension cords for tape recorders.

The third room, for special interviews, should contain a few small tables (bridge-table size) with chairs around them for special interviews, when a reporter asks to speak privately to a particular scientist who may or may not be included as a speaker at a press conference. This room, private and quiet, will be available also for TV or radio interviews. By the way, don't tell other writers about a "requested" news interview. It should be regarded as an "exclusive" for the reporter who seeks it.

Now that you have planned the news conferences, invited the speakers, and written and sent out the general release and the news conference schedule with lay-language papers attached, your next major effort will take place during the meeting itself.

B. During the News Conference

One person, probably you, Dear Reader, must control the news conference. Act decisively, with the confidence of the impresario or the ring master, and you'll not fail. At a short get-together with the scientists just before the news conference, ask them to sum up in 5–8 minutes what is covered in their papers that have been—or will be—presented at the general meeting. Request that they avoid jargon and math formulas. Clarify the scientists' preferences in their titles and pronunciation of their names. If a conference is scheduled for, say, ten o'clock, then at ten o'clock you should, in your most authoritative, pleasant voice call the milling reporters and scientists to their seats. You may then announce which side of the room is reserved for smokers. With the scientists now seated on the dais and the reporters in their seats, and you in your position at the front of the room, greet everybody and mention the following points in a brief introduction to the news conference:

—Announce the title of the news conference, taken usually from the meeting's session title in the bulletin.

—Introduce the members of the panel and their affiliations. You have, of course, already gone over this with the scientists privately.

—Announce that questions may be asked by reporters at any time.

—Ask reporters to observe release dates for their stories.

—In most cases, announce that reporters may take photographs and tape record.

—Make clear that everything said at the conference is "on the record."

At the close of each presentation or after the allotted time for summary has been used up, indicate the start of the formal question and answer period. As the person in charge, you are obligated to move the conference along so that everyone on the dais has a chance to present a summary.

A news conference with four speakers should be allotted an hour, those with one or two speakers only a half-hour. More time can be

devoted to sessions of great interest. At the end of the allotted time period, you, as moderator, must bring the session to a close. You can do this by suggesting that the reporters can now perhaps retire and question the scientists on their own.

When news conferences are scheduled from morning until afternoon, it's useful to provide a light sandwich lunch for the newsroom. This saves the scientists and reporters from having to search for a meal, offers a chance for everybody to get acquainted, and also serves to keep the reporters around for the next session.

One should remember, at this point, that regardless of your detailed planning, the unforeseen will occur—an out-of-control news conference, a vagrant who wanders in, no scientists showing up in a room full of reporters, or no reporters showing up for a scientist-filled dais. To cover those situations that seem catastrophic, the advice is simple: Take a deep breath, speak slowly and positively, and make a decision. As the old judge said to his neophyte colleague, "Give your decisions resolutely, but never state the reasons. You'll probably be correct in your decision, and totally wrong in your reasons." Running a news conference is no different.

C. After the Meeting

The process of publicizing a meeting concludes with yet another news release, the "Highlights" (see Appendix F). This release is a capsule summary of the three or four most important research topics taken up in the news conferences.

And, lo and behold, you'll soon see articles based on your news conferences. Any printed articles that were inspired by the news conferences should be copied and sent to the appropriate scientists, along with a note saying, "thank you for participating."

CHAPTER IV
PI FOR THE INDIVIDUAL WHO SEEKS PUBLICITY FOR A NEW RESEARCH DEVELOPMENT

A. Notifying the Media

If a scientist wants to announce significant work at a news conference, the first contact to be made should be with one's own PI office. The PI staff will set the necessary machinery to work *but only* if:

1. The story is current, can best be told by the scientist, will bring questions from reporters, or is something that could not be conveyed effectively by news release or telephone.
2. The principal is disposed to answer reporters' questions in detail.
3. The story can be released immediately after the conference.

The scientist who has contacted the PI office has the prerogative to decide when and where to hold the conference and who should be invited. But, in seeking the PI department advice, the PI office has the duty to advise against what may be counter-productive choices made by the scientist, such as a news conference at 6 P.M. Sunday evening. Also, the PI office should insist that all accredited reporters be allowed to attend out of fairness and in the interest of future media relations.

In helping the scientist plan the news conference, media release times must be considered. If you call conferences from time to time, schedule them alternately for the AM and PM. (PM papers gripe constantly that AM papers always get preference when releases mention only the *day* scheduled for release.)

The PI office must notify the press, television, and radio of the conference at least 24 hours in advance. Tell them what the subject matter is, who will take part, and when and where it will be held. It is best to do this in writing, but do notify by phone if the conference must be called on short notice.

You should have a prepared statement or packet of material for those who attend. It's best to make such material available beforehand to reporters who cannot come to the conference.

B. Television Coverage—Simplicity, Clarity, Brevity

If you expect to have a TV crew attend the conference, the scientist(s) should pay attention to appearances. Solid colors only should

be worn; patterned materials sometimes appear to walk all over the home screen. White shirts or lab coats should be avoided as they're often too bright for good TV images. And the lights will be hot, so don't forget a handkerchief to mop up the perspiration just before the cameras roll.

Most important, scientists should come to the conference knowing what they want to say in *8th grade terms*. Scientists should attempt to speak in short sentences which are far easier to edit for TV or radio than long, rambling ones. In fact, overly long sentences tend to get cut out entirely. Scientists should arm themselves with several simple analogies, since analogies suddenly whisk complex topics into the realms of their audience's experiences. Even more valuable are clear and exciting visual demonstrations or graphics—television's meat (for more information see p. 17).

CHAPTER V
PI FOR THE INDIVIDUAL APPROACHED BY LOCAL MEDIA

And sometimes, you just sit back and let it all happen.

The news media come to you. An interview is initiated by a writer or broadcast journalist who wants to talk to a scientist or to an authority on a specific subject. The interview implies exclusiveness and any story obtained by the writer must not be sent out in a release to others. An interview can also be suggested to a writer by a PI person who sees a promising story in a scientist's work. The work in itself might not be hard news, but again, it's the news peg, to which you relate the scientists work, that will make the story attractive.

A. Find out the Reporter's Credentials and Establish Ground Rules

The scientist who is approached by the media has every right, in fact, an obligation, to know full well whom the reporter represents. Be careful of writers who gloss over their own identification and mumble something to the effect that their report has been commissioned by a particular publication. Sometimes, these reporters only hope to sell the story to that publication. If you are not familiar with the organization of the writer or reporter, it's better to find out more about it in detail before consenting to an interview. Sometimes it s useful to ask the would-be interviewer point blank whether he or she is working on an assignment or on speculation.

At the outset, scientist and reporter should decide what part, if any, the scientist should play in reviewing a story after it's written. If a writer feels that he or she is under no obligation to show the copy, the scientist should be told in advance. But it's up to the scientist who is sensitive about this issue to find out beforehand if the writer will show the work for approval. If a review is to be a condition of the interview, this should be made clear before the interview and not after it has begun. Many science reporters are more than willing to check copy for accuracy *if* time permits. They will probably choose to read the copy over the telephone. The scientist's corrections should be limited to scientific fact, paying special attention to the accuracy of direct quotes. Scientists will enhance their credibility while easing the work load of reporters by citing additional references that reporters can consult.

Scientists should be very aware of the fact that something cannot be taken "off the record" retroactively. If it's absolutely a necessity to speak off the record, the time to do so is before the interview takes place, with a

clear announcement that the following remarks are "off the record." Keep in mind, however, that reporters dislike off the record comments and would rather be able to report all information they receive.

When an interview is for broadcast, remember that radio and television reporters usually can tell only the barest essentials of a scientist's work or statement. They're looking for succinct answers to one or two questions.

B. More on TV Coverage (see also p. 14)

For a television interview away from a studio, "on location," be sure the room is big enough and insulated from distracting noises, that proper power outlets are handy, and that the background for filming or videotaping is uncluttered and presentable. If you wish, put together a display, such as charts or diagrams, that make the subject clear. (There is always the possibility that it may not be used.) For TV, such charts must be extremely rudimentary with writing kept large and to a minimum. Also, in making charts, keep in mind the 3 × 4 proportions of a TV screen, 3 units high to 4 units wide. Photographs and slides, too, must be shot horizontally to fit the screen.

Think carefully about what there is about your work to *show* to TV. Suggest shots to the crew. They will be happier to shoot active scenes that describe your work rather than just to picture a talking head. Help them in that regard.

You should know what to say in a radio or TV interview in the simplest, most concise terms possible. Usually, a TV or radio interviewer will go over the questions to be asked beforehand. Remember that analogies from everyday life help give your topic added interest. Steer clear of time-consuming details, rambling explanations, and complicated answers. If you feel as though you're rambling, you probably are, and that section just won't be used. Ask if you can repeat something if you feel you can say it better than you did, but try not to request retakes too often.

C. Role of PI Offices When Media Approach Scientists

Many institutions and companies require public information people to be present at all news interviews. But the information officer should keep out of the interview as much as possible in such a situation. The PI officer is entitled to ask the reporter in advance what questions he or she is specifically interested in. This way, the interviewee can be better prepared for the interview. The officer can also suggest to the reporter the sort of questions that probably won't be answered, and which queries may offer the most promise.

CHAPTER VI
THE DON'TS OF PI

So much for what a PI representative should do. Here are a few "Don'ts" covering faults which editors complain of most frequently.

—DON'T telephone editors and news directors every time you send a release asking if it will be used, or why it wasn't used.

—DON'T ask reporters when a story will appear (they don't know).

—DON'T ask reporters to send clippings (they haven't got the time or the help to take care of it).

—DON'T give exclusives when the material to be provided is in the public domain. On the other hand, you should protect the exclusives of reporters who have dug out a story by their own ingenuity.

—DON'T initiate contact with reporters unless you are prepared to guarantee complete and accurate information.

—DON'T make your stories impossibly long. Even an amateur publicist is expected to have some idea of reasonable length. Few releases should run longer than two typewritten pages.

—DON'T get your news in too late. This is probably the most common single complaint of all publications. They want their news fast. If it's too old they won't use it because it is no longer news.

—DON'T use expressions of unattributed opinion, rather than fact. You *can't* say: "The most important engineering meeting ever held in this city will take place next Tuesday evening." You *can* say: "The most important engineering meeting ever held in this city, according to Mayor Henry Kensing, will take place next Tuesday evening." Reporters have to attribute value judgments to some authority, and a news release itself is not an authority.

—DON'T schedule a news conference at the same time that another scientific event occurs in your locale. If you have no choice because two meetings are scheduled, call the PI representative for the other meeting and try to work out non-conflicting schedules.

AFTERWORD

Remember that the Public Information Division's staff is available at all times to answer questions, give suggestions, and proffer advice. We can, for example, provide names of science reporters and other appropriate media people in different geographical areas.

Good Luck!

APPENDIX A. Print-Oriented News Release

AIP news release

American Institute of Physics, 335 East 45 Street, New York, N.Y. 10017 (212) 661-9404

Contact: Audrey Likely
Public Information Division

For further information, contact:
Phillip Schewe, (212) 661-9404 Ext. 520

FOR IMMEDIATE RELEASE

THE SHROUD OF TURIN

The Turin Shroud is an ancient piece of linen measuring 4.4 X 1.1m, and is believed by some to be the burial cloth of Jesus. The linen bears the faint images of a man, front and back, as well as numerous blood stains. In addition, there are scorch marks left by a fire in 1532 A.D. and the water marks left by the flame quenching. In October, 1978 a team of American and Italian scientists and support technicians examined the shroud using modern scientific instruments. Certain results of these tests are published in the June 15, 1980 issue of Applied Optics.

In the article "Spectral Properties of the Shroud of Turin," S.F. Pellicori concludes: (a) that the bloodstained areas have the spectral characteristics of human hemoglobin; (b) that the reflection spectrum of the body image resembles that of a deposit of perspiration plus skin oils; and (c) that lightly scorched areas are spectrally similar to the body images. These conclusions are based on the spectrum of light reflected from the shroud in those visible and ultraviolet wavelength bands where the images had their highest contrast. Pellicori recommends several steps for preservation of the shroud, such as storage in an inert gas atmosphere and at conditions of constant temperature and humidity.

A second paper, based on an infrared illumination of the shroud, is less conclusive, reporting only a spectral similarity of the body image areas and scorch marks in the wavelengths studied.

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AIP

A third paper, based on ultraviolet and visible reflectance and fluorescence spectra, concludes that body images and scorch areas have similar fluorescence characteristics, while the spectral reflectances of the body and scorch areas are substantially different from that of the bloodstains.

More data from the tests will be forthcoming, including the results of x-ray fluorescence, x radiography, photography, and chemical analysis of the shroud material.

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8/25/80

APPENDIX B. Lay-Language Abstract

news release

American Institute of Physics, 335 East 45 Street, New York, N.Y. 10017 (212) 661-9404

Contact: Audrey Likely
Public Relations Division

AIP

FROM: NEWSROOM, MARCH MEETING OF
THE AMERICAN PHYSICAL SOCIETY

Indiana, Illinois, and Iowa Rooms, 6th floor
Chicago Marriott Hotel, Chicago, Illinois
Meeting Dates: March 19-23, 1979
Telephone: (312) 836-0100

RELEASED FOR THURSDAY MORNING, MARCH 22, 1979

Author's Popular Version of Paper: KI-1

"THE MAGNETIZATION OF ANCIENT POTTERY
AND ITS POTENTIAL FOR DATING IN ARCHAEOLOGY"

Presented by: Derek Walton
Physics Department
McMaster University
Hamilton, Ontario L8S 4M1
Canada

*Member Societies: American Physical Society • Optical Society of America • Acoustical Society of America • Society of Rheology
American Association of Physics Teachers • American Crystallographic Association • American Astronomical Society
American Association of Physicists in Medicine • American Vacuum Society*

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APPENDIX B. Lay-Language Abstract

The Magnetization of Ancient Pottery and it's Potential for Dating in Archaeology

DEREK WALTON

McMaster University and Research Laboratory for Archaeology, Oxford University

Clay normally contains a few per cent of complex iron oxides. Therefore, when it is fired to produce pottery and then cooled in a magnetic field it becomes magnetized. For small magnetic fields, such as that of the earth, the magnetization is proportional to the field. Therefore, if the earth's field has varied in antiquity this will lead to a varying degree of magnetization of the pottery produced. If it is possible to associate the magnetization present in the pottery with the magnetic field present when it was fired, we should be able to date the pottery. Since pottery is probably the single most prevalent fabric in the ancient world this would be very useful.

Actual measurements of the magnetic field intensity exist for only the last one hundred years or so. The first task, then, is to extend these values to the past few thousand years. This can be done using the magnetization of archaeologically well-dated pottery, by in fact reversing the procedure referred to above. In this way the temporal variation of the intensity of the earth's magnetic field can be obtained for the region which produced the pottery.

Ancient Greece was a prolific producer of fine pottery which has long been the subject of classical study. It is possible to distinguish dates of manufacture of ancient Greek pottery by as little as 10 years. Thus Greece provides an ideal location for such a study.

We have used material excavated from the ancient Agora of Athens to establish intensities of the earth's magnetic field between 2000 B.C. and A.D. 400. These measurements reveal that the earth's magnetic field varied a great deal in antiquity, reaching as much as twice the present day value. These fluctuations are potentially very useful for dating, particularly if they are characteristic of a large region. Our next goal is to try to determine how wide-spread they are using material from other parts of the mediterranean.

APPENDIX C. TV Release w/Slides

news release

AIP

American Institute of Physics 335 East 45 Street, New York, N.Y. 10017 (212) 661-9404

Contact: Audrey Likely
Public Relations Division

From: David Kalson
Science Broadcast Coordinator

Subject: MHD--ENERGY FROM COAL WITHOUT THE POLLUTION

Released for March 19, 1979

Timing: 1:00

VIDEO	AUDIO
Slide #1(drawing of MHD plant) Super Title: ARTIST'S MODEL OF MHD POWER PLANT, BUTTE, MONTANA	/ ONE PROBLEM RESETTING THE USE OF COAL FOR POWER PLANTS IS POLLUTION--TOXIC WASTE GASES AND SOOT. BUT A PROMISING NEW COAL TECHNOLOGY, BEING DISCUSSED THIS WEEK AT THE AMERICAN PHYSICAL SOCIETY MEETING AT THE CHICAGO MARRIOTT HOTEL, COULD CHANGE THAT.
(mag ˈnet o ˈhī dro dī ˈnam ics)	IT'S CALLED MAGNETOHYDRODYNAMICS OR MHD.
Slide #2 (MHD Generator)	/ MOST OF THE USUAL POLLUTANTS FROM COAL NEVER LEAVE THE MHD POWER GENERATOR. THEY REMAIN BEHIND AS A SOLID RESIDUE--EASILY COLLECTED. AND, AN MHD GENERATOR IS TEN PERCENT MORE EFFICIENT THAN A TYPICAL COAL-FIRED GENERATOR.

(MORE)

Member Societies: American Physical Society • Optical Society of America • Acoustical Society of America • Society of Rheology
American Association of Physics Teachers • American Crystallographic Association • American Astronomical Society
American Association of Physicists in Medicine • American Vacuum Society

Slide # 3 (MHD Plant)
Super Title:MHD PLANT
U. OF TENNESSEE

/ IN AN MHD PLANT, AN ELECTRICALLY-CHARGED GAS MADE FROM COAL

Slide # 4 (MHD diagram)

/ FLOWS THROUGH A MAGNETIC FIELD AND GENERATES POWER. THE MAGNETIC FIELD IS CREATED BY A SUPERCONDUCTING MAGNET

Slide # 5
(Superconducting Magnet)

/ LIKE THIS ONE MADE AT ARGONNE NATIONAL LABORATORY IN ILLINOIS. IT IS USED IN JOINT SOVIET-AMERICAN MHD TESTS IN MOSCOW.

THE NEXT TEST WILL TAKE PLACE THE END OF APRIL.

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APPENDIX D. General Release Announcing A Meeting

AIP news release

American Institute of Physics, 335 East 45 Street, New York, N.Y. 10017 (212) 661-9404

Contact: Audrey Likely
Public Information Division

Town and Country Hotel and Convention Center, San Diego, California
Meeting Dates: November 10-14, 1980
Contact during the meeting:
Dr. Gareth Guest, Press Room
tel. (714) 291-7131

FOR IMMEDIATE RELEASE

PLASMA PHYSICISTS TO MEET IN SAN DIEGO

San Diego, Calif., November--: Physicists from fusion energy-related fields will convene in San Diego, California, at the Town and Country Hotel and Convention Center, November 10-14, 1980 for the 22nd Annual Meeting of the Division of Plasma Physics of The American Physical Society (APS). More than 2,000 physicists will present the results of their recent research in plasma physics, much of which relates to fusion energy reactor projects. Fusion energy, which results from fusing together atomic nuclei by a variety of technologies, could develop into the major energy source of the future. President Carter and Congress recently underlined the importance and potential of fusion energy by passing and signing the Fusion Energy Act of 1980, aimed at developing and deploying fusion energy reactors by the turn of the century.

The weeklong program will include presentations by prominent experts involved in the various types of fusion research. The Tokamak approach is the leading contende in the effort to produce a self-sustaining fusion reactio.. Tokamaks are in operation or under construction in a number of locations, including Princeton Plasma Physics

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Laboratory, Oak Ridge National Laboratory, Massachusetts Institute of Technology, and overseas at the Japan Atomic Energy Agency Research Institute, and Germany's Euratom-Association Laboratory, Institute for Plasma Physics. Experts from these various Tokamak research centers will describe the latest results.

Progress in other fusion techniques, alternatives to Tokamak designs, will also be presented: Germany's Stellarator, Oak Ridge National Laboratory's Elmo Bumpy Torus, Lawrence Livermore's Mirror Machine, and the latest ideas on inertial confinement.

Providing an overview to the different fusion techniques will be Dr. Edward A. Frieman, Director of Energy Research, Department of Energy. Dr. Frieman will describe and discuss the new National Policy on Fusion Energy on Wednesday evening, November 12 at 8 P.M.

At the same event, Dr. Thomas Stix, Princeton Plasma Physics Laboratory, will receive the James Clerk Maxwell Prize for his role in the development of advanced plasma heating methods for controlled fusion devices.

Much new research hardware will be on view during the meeting at the Plasma/Fusion Show. Some 63 companies will be displaying a wide range of equipment such as array-processors, diagnostic/detection devices, novel vacuum hardware, cryogenic apparatus, superconducting materials, electro-optical products, and many more.

Dr. Nicholas A. Krall is the Chairman-Elect of the APS Division of Plasma Physics, and also serves as Program Chairman of the meeting. Dr. Gareth Guest is Arrangement Chairman and will be in charge of the news room. Either Dr. Guest or Dr. Krall will arrange interviews as desired.

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10/31/80

news release

American Institute of Physics, 335 East 45 Street, New York, N.Y. 10017 (212) 661-9404

AIP

Contact: Audrey Likely
Public Relations Division

FROM: NEWSROOM, MARCH MEETING OF
THE AMERICAN PHYSICAL SOCIETY

Indiana, Illinois, and Iowa Rooms, 6th floor
Chicago Marriott Hotel, Chicago, Illinois
Meeting Dates: March 19-23, 1979
Telephone: (312) 836-0100

SCHEDULE OF PRESS CONFERENCES

MONDAY, MARCH 19, 1979

11:00 A.M. COAL LIQUEFACTION

V. Udaya S. Rao, Pittsburgh Technology Center, D.O.E. (BB-2)
Gerry Sorell, Exxon Research and Engineering (BB-3)
Nancy O'Fallon, Argonne National Laboratory (BB-4)

The history of coal liquefaction is more than 2000 years old. Today more than 30 different processes are being investigated, but the procedures are not easy and are not necessarily economical. New and improved approaches require a better fundamental understanding of coal and coal liquids. In addition there are important materials engineering challenges that must be met, particularly because of the hostile conditions that exist within coal liquefaction plants: high pressure, high temperature, corrosion, erosion, etc.

(RELEASED FOR TUESDAY A.M.)

12:15 P.M. COAL UTILIZATION

Bernard R. Cooper, University of West Virginia, Presiding
W. Spackman, Pennsylvania State University (AB-1)
Atam P. Sikri, Department of Energy (AB-3)
Kenneth E. Tempelmeyer, Argonne National Laboratory (AB-4)

The physical characterization of coal as a material; the conversion and combustion of coal; the Department of Energy underground coal conversion program, with the potential of recovering four times as much coal than is presently economically accessible; and magnetohydrodynamics as an opportunity to utilize high-sulfur coal more efficiently than is conventionally possible -- these are the subjects of this session of the coal symposium.

(RELEASED FOR TUESDAY A.M.)

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American Association of Physicists in Medicine • American Vacuum Society

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MONDAY, MARCH 19, 1979 (Continued)

1:15 P.M. SCIENTIFIC POLICY AND FUNDING

Peter M. Rentzepis, Bell Laboratories, Presiding
Joel A. Snow, Department of Energy (AA-1)
David E. Mann, Department of the Navy (AA-2)
George C. Pimentel, National Science Foundation (AA-4)

The research and its funding in the Department of Energy, the National Science Foundation, the Navy, and in private industry are the subjects of this session.

(RELEASED FOR TUESDAY A.M.)

TUESDAY, MARCH 20, 1979

11:00 A.M. OPTICAL FIBER COMMUNICATIONS

Henry Kressel, Presiding
Amnon Yariv, California Institute of Technology (GC-1)
Robert J. McIntyre, RCA Limited, Canada (GC-2)

Semiconductor lasers, detectors, fiber optics, and systems for optical fiber communications will be discussed.

(RELEASED FOR WEDNESDAY A.M.)

12:15 P.M. MAGNETIC DEVICES

F.B. Hagedorn, Bell Laboratories, Presiding
J.L. Archer, Rockwell International (DC-1)
Arie J. Kurtzig, Hewlett-Packard Laboratories (DC-2)
J.W. Shilling, Allegheny-Ludlum Steel Company (DC-3)

Magnetic bubbles and cores; magnetic recording devices such as video recorders, computer disk drives, digital tape drives, etc., and potential products such as digital audio and video recorders; motors, generators, transformers, relays, and many more devices using soft as well as hard magnetic materials are all subjects of this session.

(RELEASED FOR WEDNESDAY A.M.)

1:15 P.M. MEDICAL IMPLANTATION OF POLYMERIC PROSTHESES

James M. Anderson, Case Western Reserve University (HS-1)

Impressive advances have been made in the length and quality of survival in patients who receive polymeric prostheses. In a program of implant retrieval and analysis, investigators study biocompatability -- the implant/host interaction -- using material analysis techniques that include transmission electron microscopy, scanning electron microscopy, infrared spectroscopy, and colorimetry.

(RELEASED FOR WEDNESDAY A.M.)

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WEDNESDAY, MARCH 21, 1979

10:00 A.M. INERTIAL CONFINEMENT FUSION

Jacques Denavit, Northwestern University, Presiding
Clinton M. Logan, Lawrence Livermore Laboratory (JB-1)
S. Goldstein, Naval Research Laboratory (JB-2)
Thomas F. Stratton, Los Alamos Scientific Laboratory (JB-5)

The response of materials to neutron exposure, particle-beam drivers, target pellets, and lasers will be discussed.

(RELEASED FOR THURSDAY A.M.)

11:00 A.M. MAGNETIZATION OF ANCIENT POTTERY

Derek Walton, McMaster University (KI-1)

Cooling of fired pottery in the earth's magnetic field produces in the pottery a magnetization that is potentially useful for archeological dating.

(RELEASED FOR THURSDAY A.M.)

THURSDAY, MARCH 22, 1979

10:00 A.M. TECHNOLOGICAL INNOVATION

Paul Horwitz, AVCO Everett Research Laboratory, Presiding
Betsy Ancker-Johnson, General Motors (MA-1)
Elmer H. Burack, University of Illinois (MA-4)

U.S. technological innovation is lagging behind that of other industrialized nations. The government's patent policy is blamed as one of the causes. Innovation in small business has seriously declined, but it can once again create new economic energy.

(RELEASED FOR FRIDAY A.M.)

11:00 A.M. ASTROPHYSICS

W. David Arnett, University of Chicago, Presiding
Don Q. Lamb, Jr., University of Illinois (MB-1)
Michael S. Turner, University of Chicago (MB-3)
James R. Ipser, University of Chicago (MB-4)

Hot dense matter and stellar collapse; the physics of the giant planets; indirect evidence and prospects for direct evidence for the observation of gravitational waves; and gravitation in systems of many bodies will be discussed in this astrophysical pot pourri.

(RELEASED FOR FRIDAY A.M.)

A sandwich lunch will be served in the Newsroom on Monday, Tuesday, and Wednesday.

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American Institute of Physics, 335 East 45 Street, New York, N.Y. 10017 (212) 661-9404

Contact: Audrey Likely
Public Information Division

FOR IMMEDIATE RELEASE

HIGHLIGHTS FROM PAPERS PRESENTED AT
THE AMERICAN PHYSICAL SOCIETY MEETING
IN WASHINGTON, D.C. APRIL 28-MAY 1, 1980

NEUTRINO OSCILLATIONS (HA-4)

At any moment, our understanding of the physical world can be characterized by certain models, mathematical formulations which both classify particles according to their static properties, such as mass, charge, and spin, and which attempt to account for their dynamic behavior during interactions. A successful theory is one which can explain all of the existing data. When data from new experiments refute the theory, the old data have to be reexamined, and new theories developed.

Such may be the case for an experiment discussed by Frederick Reines of the University of California, Irvine. This experiment, conducted at a reactor in Savannah River, South Carolina, appears to show that neutrinos, long thought to be massless particles travelling at the speed of light, have mass, and that they "oscillate" among each of several types of neutrinos. Such a development could have a large impact not only on theories of particle physics, but theories of cosmology as well:

-When a muon neutrino changes into an electron neutrino, and then back again, it ceases to conserve "lepton number." This conservation law has never had a fundamental theoretical basis so its violation, although unexpected, should not be too surprising. In fact, Reines and others are preparing experiments which, it is hoped, will demonstrate the violation of yet another venerable "law," namely the conservation of baryon number. Evidence for this would be the observation of proton decay.

-The special theory of relativity demands that a massless particle travel at the speed of light. A neutrino with even a small mass (100 electron volts, say) would travel at a sub-light speed.

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-One explanation of the neutrino's oscillation is that a physical neutrino never exists as a pure state of electron- or muon-neutrino (the contribution of the hypothesized tau neutrino would be very small) but a mixture of the two. The relative proportion of the two components changes with time, or, equivalently, with distance along the neutrino's line-of-flight through the laboratory.

-Experiments observing neutrinos from the sun were designed to spot only one kind of neutrino and so missed seeing those neutrinos of the wrong variety when they reached the earth.

-Since so many neutrinos are released in the reactions taking place in stars, even a very small neutrino mass (a few electron volts) could double the mass density of the universe, and thus modify prevailing theories of cosmology.

Reines' experiment uses electron antineutrinos issuing from a 2000 MW nuclear reactor. The antineutrinos then interact in a container of "heavy water" located outside the reactor. Evidence for neutrino oscillations comes from observing the relative interaction rates for several types of reactions, and the examination of old reactor data. Several other physicists are also reexamining old data hoping to shed light on this interesting subject.

A NEW BINARY PULSAR (BI-7)

A majority of stars in the universe belong to a binary star system. That is, they are in an orbit about another star. Pulsars are celestial objects which emit intense short bursts of radiation (usually) at radio wavelengths, at regular intervals. There are approximately one hundred known pulsars. Last year, Joseph Taylor, at the University of Massachusetts, and his colleagues announced the discovery of the first binary pulsar, a radio emitting pulsar in orbit about a companion star. In addition to being very rare, this binary pulsar also provided indirect evidence for gravity waves. This pulsar is at a distance of 16,000 light years. A second, less interesting, binary pulsar has since been observed at 2,000 light years.

At this meeting, Dr. Taylor announced the identification of a third binary pulsar, this time only 1,000 light years away. The data was collected at the National Radio Astronomy Observatory in Green Bank, West Virginia. This binary system is interesting because the orbit of the two objects about each other is nearly circular, with an orbital period of 24 hours. The radio pulsar is believed to be a rapidly spinning neutron star. The companion may also be a compact object, such as a white dwarf or even another neutron star. Attempts are being made to spot the companion in optical (visual) wavelengths.

The companion of the pulsar is also being sought at x-ray wavelengths. David Helfand (Paper BI-7) of Columbia University reported on a study of radio pulsar positions being done with the Einstein Observatory, an x-ray telescope in orbit around the earth. Two x-ray sources have been detected in the vicinity of the pulsar.

-more-

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GAMMA-RAY BURSTS AND VIBRATING NEUTRON STARS (EB-3,4)

On March 5, 1979 a burst of gamma rays lasting only one-eighth of a second was observed by a network of American and Soviet spacecraft. Because the satellites were deployed over so wide an area, some orbiting the earth, some around Venus, and some around the sun, a triangulation succeeded in locating the source of the gammas to a position inside a supernova remnant in the Large Magellanic Cloud (LMC), a galaxy 190,000 light years away. Gamma ray transients have been observed before, but their locations had never before coincided with an identifiable celestial object. Nor had they ever been so powerful. The rate of energy release, an estimated 10^{44} ergs in an eighth of a second, is more than that for the entire Milky Way galaxy, and exceeds by a factor of one hundred the most powerful previous burst. This energy calculation assumes that the location in the LMC is correct.

The observations of the burst were made by astronomers from France, the Soviet Union, and from NASA Goddard Space Flight Center and Los Alamos Laboratory in the U.S. Gamma rays are the most energetic form of electromagnetic radiation and derive from the emissions of excited nuclei or from the annihilation of particles with their antiparticle counterparts.

W. Doyle Evans (Paper EB-3) of Los Alamos reported two such distinctive gamma emissions amid the energy spectrum of the incoming burst. The first is at 511 keV (redshifted down to 420 keV), characteristic of the annihilation of electrons with positrons. The second is at 847 keV (redshifted down to 720 keV), characteristic of the first excited nuclear state of iron. The LMC is relatively close to our galaxy so not all of this redshift can be attributed to the object's recession from earth. It is thought that a strong gravitational force is acting to retard, and therefore redshift, the outgoing radiation.

Reuven Ramaty (Paper EB-4) from Goddard calculates from the observed redshift that the size of the radiating source is about 10 km, a very compact object to be emitting so much energy. He suggests that the source of the gamma burst is a neutron star undergoing cataclysmic vibrations. The strong magnetic fields surrounding the star oscillate in step with the vibrating stellar surface. These changing fields, in turn, accelerate particles which emit gamma photons as synchrotron radiation (analagous to the radiation given off by energetic particles travelling through terrestrial accelerators); this environment of energetic particles and hot plasmas (billions of degrees) also promotes electron-positron annihilation, the other principal source of gammas. An important feature of this model is that the radiation of gravitational waves should quickly predominate over the radiation of gamma rays as the principal mode of energy emission from the star. This hypothesis is consistent with the shape of the observed gamma burst: a very sudden rise (200 microseconds) and then a decline over an eighth of a second, followed by several much smaller pulses lasting seconds.

The binary pulsar reported last year (see the above report of a new binary pulsar) represented indirect evidence of gravitational radiation. Such radiation was inferred from the dampening of radio emissions from the pulsar over a period of several years. Inferring, now, the radiation of gravitational waves from the dampening of gamma radiation, for a transient phenomena lasting only seconds, is more tentative, but still instructive. Better tests of general relativity may follow the use of more sensitive gamma detectors, or the direct observations of gravitational radiation.

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